Background/Aims: Insulin is one of the most potent anabolic agents involved in the macronutrients synthesis and storage. It plays a pivotal role in the development of obesity while within the central nervous system acts as a growth factor in synaptogenesis and nerve growth. Therefore the lack of insulin or presence of insulin resistance (IR) could potentially lead to cognitive decline and impaired learning. This review focuses on animal and human studies that assess the relationship between the IR and regulation of cognitive function and mood.
Methods: Literature searches were conducted on electronic databases examining the association between insulin resistance, glucose regulation, obesity, cognitive function and mood.
Results: In animal models, the central focus is on effects to the hypothalamic-pituitary-adrenal axis (HPA-axis), an area identified as the most likely area to influence mood and stress. Damage to the insulin receptors in this region was found to be associated with the increase in food intake and occurrence of adiposity. In humans, these areas play a central role in motivation and decision making. Furthermore, IR and major depressive illness share several pathologies, including disorders of the HPA-axis, the autonomic nervous system, platelets and endothelial function.
Conclusions: There is increasing evidence suggesting a close association between the obesity and mood disorders such as depression, anxiety, panic and bipolar disorders. However, there is no clear evidence of individual aspects that can be ascribed as pathological drivers of the problem.
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IMPAIRED CEREBROVASCULAR RESPONSIVENESS TO A WORKING MEMORY TASK IN OLDER ADULTS WITH TYPE 2 DIABETES MELLITUS (T2DM)

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Background/Aims: Impairments in specific cognitive domains in T2DM may be partly attributable to stiffness in cerebral arteries, resulting in poor cerebral perfusion. This cross-sectional study investigated whether impairments in the ability of the cerebrovasculature to supply blood in response to a battery of cognitive tests could predict poorer cognition in T2DM.
Methods: Forty nine T2DM and 28 non-T2DM adults underwent transcranial Doppler ultrasound measurements of basal mean cerebral blood flow velocity (MBFV) and pulsatility index, a measure of arterial stiffness, in the left and right middle cerebral arteries (MCA). A battery of cognitive tasks assessing domains of working memory, executive function and information processing speed was then administered whilst MBFV was recorded. Cerebrovascular responsiveness (CVR) to cognitive tasks was calculated as a percentage increase in MBFV from the basal level.
Results: Using *t*-tests, we found no differences in basal MBFV; however, cerebral vessels were 14 percent stiffer in T2DM ($p < 0.05$). As expected, T2DM performed poorer in tasks relating to working memory (i.e. N-back, Digit-Symbol Coding, Symbol-Digit Coding), executive function (Concept Shifting Task) and information processing speed. Importantly, CVR to the N-back task was reduced by 53 percent in T2DM ($p < 0.05$) but was independent of task performance.
Conclusions: We have shown for the first time that impaired cerebral perfusion during a working memory task is accompanied by poor task performance. We plan to evaluate the ability of selected *vasoactive* nutrients to enhance cerebrovascular function and see whether this improves cognition in at-risk populations.
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INCIDENCE AND RISK FACTORS OF TYPE 2 DIABETES: RESULTS FROM THE THAI COHORT STUDY

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Background/Aims: The global prevalence of type 2 diabetes mellitus (T2DM) is high and increasing rapidly in countries undergoing a nutrition transition like Thailand. This study aimed to assess the relationship between T2DM and factors associated with the nutrition transition among Thai adults.
Methods: Data were from Thai Cohort Study participants surveyed in 2005, 2009 and 2013 ($n = 39{,}519$). Cumulative incidence of diabetes was calculated and multivariable analyses were conducted using logistic regression.
Results: T2DM incidence (per 1000) was higher in males (24.9 *vs.* 11.9). The factors most strongly associated with T2DM in both sexes were increasing age and BMI but, amongst males, smoking [Odds Ratio (OR) =1.70, 95%CI: 1.29-2.24] and alcohol intake (OR = 1.67, 95%CI: 1.00-2.82) were also associated with increased risk. Infrequent gardening, low vegetable intake, and urban childhood residence were also related to T2DM risk however these associations attenuated after adjusting for BMI. Among females, high income was associated with T2DM (OR = 1.72, 95%CI: 1.03-2.89). Urban childhood residence and education were also associated with T2DM however these associations were attenuated after adjusting for BMI.
Conclusions: The factors associated with T2DM risk in our study are consistent with findings from previous studies conducted in countries undergoing a nutrition transition. With the prevalence of these factors projected to increase it is likely that the incidence of T2DM will keep rising. This may be of particular concern for Thai men who appear to be in the earlier stages of the nutrition transition. Our study suggests that females are at a more advanced stage of the nutrition transition.
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LAURIC ACID DIFFERS FROM OTHER SATURATED FATTY ACIDS IN METABOLIC SYNDROME IN RATS

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Background/Aims: The aim of this study is to evaluate different saturated fatty acids on cardio-vascular, liver and metabolic responses in rats.
Methods: Rats were fed 20% lauric (HLA), myristic (HMA), palmitic (HPA) or stearic (HSA) acids or beef tallow (HCHF) for 16 weeks with increased fructose and condensed milk. Control rats were fed a corn starch (C) diet. Food and water consumption, body weight, body composition, heart stiffness, blood pressure, blood glucose, lipid profiles and liver function of rats were measured.
Results: Final body weight ranked HLA < C < HMA = HPA = HSA < HCHF rats with HLA rats showing 11.1% decrease. Total fat mass reflected changes in body weight with HLA (54.4 ± 3.2 g) < C (79.5 ± 11.0 g) < HPA (122.7 ± 12.9 g) = HSA (122.9 ± 9.5 g) = HMA (132.4 ± 9.9 g) < HCHF rats (207.7 ± 27.2 g). Left ventricular diastolic stiffness (κ) was similar in control (22.0 ± 0.5) and HLA rats (21.8 ± 1.0) but less than HMA (25.3 ± 0.7), HPA (26.6 ± 0.7), HSA (27.0 ± 0.4) and HCHF rats (28.2 ± 0.5). Systolic blood pressure increased with C (127.7 ± 1.1 mmHg) < HLA (136.2 ± 5.3 mmHg) = HMA (141.7 ± 1.2 mmHg) < HPA (150.4 ± 2.5 mmHg) = HSA (152.9 ± 3.5 mmHg) = HCHF rats (157.8 ± 2.8 mmHg). HLA rats showed improved glucose tolerance, insulin sensitivity and attenuated dyslipidaemia compared to HMA, HPA, HSA and HCHF rats. Plasma liver enzymes increased in HLA, HMA, HPA, HSA and HCHF rats compared to C rats.
Conclusions: For most parameters, lauric acid produced less pathophysiological changes than other saturated fatty acids in this model of diet-induced metabolic syndrome.
Funding source(s): University of Southern Queensland.

HIGHER VITAMIN D STATUS IS INVERSELY ASSOCIATED WITH THE METABOLIC SYNDROME AND RISK OF T2DM IN VICTORIAN ADULTS